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## Study on the level of awareness on climatic resilient technologies among respondents in northern districts of West Bengal

**Peddi Naga Harsha Vardhan, PK Pal and Deepa Roy**

### Abstract

Climate change has become an important area of concern for India to ensure food and nutritional security for growing population. The impacts of climate change are global, but countries like India are more vulnerable in view of the high population depending on agriculture. So, Govt. of India taken initiative to address the climate change through KVKs. National Innovations in Climate Resilient Agriculture is one of the programs which are operated by ICAR through different KVKs to reduce the climate change adversities through different climate-resilient technologies. Some of the technologies are Water saving technology, In-situ moisture conservation technology, Water harvesting and recycling technology, Adoption of submergence rice variety, Azolla production, Fodder cultivation Animal husbandry for livelihood diversification, Introduction of new crops for crop diversity, Adoption of short duration rice for advancement of rabi season, Green manuring crops for soil fertility management etc. The study was conducted in two districts of North Bengal i.e., Cooch Behar and Malda in two KVKs (NICRA KVKs). One adopted villages and one non adopted village adjacent to adopted villages (as control area) were selected for study from each KVK-area. The result shows that the level of awareness of water-saving technology, in-situ moisture conservation technology, water harvesting and recycling technology and other climate-resilient technologies mean awareness score is more in the adopted villages than in the non adopted villages.

**Keywords:** Climate change, KVKs, technologies, NICRA

### Introduction

Indian Agriculture has been the backbone of the economy from several years and it still remains to be with 18per cent contribution to Gross Domestic Product (GDP) and 50% employment of country's work

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It determines the standard of life for more than 60% of our people. For many centuries India is expected to remain as an agricultural society. One cannot underplay the role of agricultural growth in improving rural incomes and securing India's food and nutritional needs. India is the world's largest

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It also remains among three main producers in paddy, wheat, pulses, groundnut, rapeseeds, natural products, vegetables, sugarcane, tea, jute, cotton and tobacco leaves. India is one of the most vulnerable countries in the world when it comes to climate change. The threat of climate change to agriculture is due to scanty and erratic rainfall pattern, shifting of seasons, more occurrences of climate extremities or increasing average daily temperature.

According to Anseera and Alex (2019) <sup>[1]</sup> regarding changed climatic conditions, there is every need to adapt or to go for mitigation measures to tune with climate change. Such phenomena will impact agriculture considerably through their direct and indirect effects on crops, livestock, and incidences of pest-disease-weeds, increasing deterioration of soil health and thereby threatening the food security like never before. National Innovations in Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in February, 2011 with the aim to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research, technology demonstration, capacity building and sponsored/competitive Grants. Krishi Vigyan Kendra (KVKs) plays a vital role in the development of agriculture in our country. Savita and Lalita (2017) <sup>[4]</sup> revealed that the Krishi Vigyan Kendra contributed positively in enhancing the adoption level of farmers in various aspects of agricultural production technologies. There are many activities done through KVK for the development of rural areas and in agriculture. Meena and Gupta (2018) <sup>[5]</sup> concluded that training programme conducted by the KVK is one of the important tools for dissemination of knowledge and technical skills to the farmers. Apart from the mandates, KVKs are also doing tremendous job towards dissemination of climate resilient technology through National Innovations on Climate Resilient Agriculture (NICRA) project.

Gorfad *et al.*, (2018) <sup>[6]</sup> reported that KVK scientists succeeded in arousing awareness, change in attitude, introduction of new varieties and increase in extent of adoption which increased the crop production and finally the income of the farmer. Dobariya *et al.*, (2017) <sup>[7]</sup> observed that KVK had played an important role in increasing knowledge, the rate of adoption and yield of improved agricultural technologies. The adoption of improved technologies depends upon not only the information farmers receive but also depends on ones socio economic conditions. Less than one

fourth of farmers could adopt advanced horticulture and modern crop seeds in Bihar. Small size of land holding and fragmented land emerged as main constraint to adoption of modern horticultural technology in Bihar (Singh *et al.*, 2014) <sup>[3]</sup>. Economic and physiographic factors like small size of land holding and fragmented land emerged as main constraint to adoption of modern horticultural technology in Bihar (Singh *et al.*, 2013) <sup>[2]</sup>.

### Materials and Methods

The study was conducted in Cooch Behar and Malda districts of West Bengal. The two KVKs were selected from the two districts which are implementing NICRA project. Two villages were selected from each KVK zone. One is the adopted village of KVK and another is Non-adopted village which is adjacent to the adopted village. The villages were selected purposively. From each village 30 respondents were selected randomly. Total 120 respondents were taken for the research work. Awareness on climate resilient technologies scales composed of doesn't know the technology and know the technology with corresponding score 0 and 1 respectively.

### Results and Discussions

#### Awareness level of respondents on Climate resilient technology

Data from Table-1 represents the awareness level on water saving technologies of farmers in the adopted and non-adopted village. It shows that 100 percent of farmers in the adopted village know about the SRI technology in rice cultivation where as 85% of the farmers know about the technology in non-adopted village. In case of knowledge of technology on In-situ vermicomposting 100.00% of adopter village farmers and 88.33% of non-adopter village farmers know the technology. In case of sprinkler irrigation 63.33% of farmers in adopted village and 8.33% of farmers in non-adopted village are aware of the technology. 48.33% of adopted village farmers and 3.33% of non-adopted village farmers know the BBF technology. In case of pulse cultivation all the farmers from adopted village and non-adopted village are aware of the technology. It -shows that 100 percent of farmers in the adopted village know about the technology of adopting drought tolerant varieties where as 76.67% of the farmers in non-adopted villages know about the technology.

**Table 1:** Awareness level on water saving technology

Sl. No.	Name of technology	Frequency of aware farmers	
		Adopted villages	Non-Adopted villages
1.	SRI technology in rice	60 (100.00%)	51 (85.00%)
2.	In-situ vermin composting	60 (100.00%)	53 (88.33%)
3.	Sprinkler irrigation	38 (63.33%)	5 (8.33%)
4.	BBF technology	29 (48.33%)	2 (3.33%)
5.	Pulse cultivation	60 (100.00%)	60 (100.00%)
6.	Adoption of drought tolerant varieties	60 (100.00%)	46 (76.67%)
Mean awareness score		5.12	3.62
t-test value		8.99**	

The mean awareness score on these technologies are 5.12 and 3.62 for adopted and non-adopted villages respectively with a t-test value of 8.99 (significant at 1% level), which indicates

that KVK-adopted villages were significantly more aware of climate resilient technologies than KVK non-adopted villages.

**Table 2:** Awareness level on in-situ moisture conservation technology

Sl. No.	Name of technology	Frequency of aware farmers	
		Adopted villages	Other villages
1.	Summer Ploughing	60 (100.00%)	35 (58.33%)
2.	Zero tillage technology	60 (100.00%)	52 (86.67%)
3.	Repair of bund	55 (91.67%)	21 (35.00%)
4.	Land embankment	31 (51.67%)	5 (8.33%)
5.	Bund making/levelling	60 (100.00%)	39 (65.00%)
6.	Plastic mulching	60 (100.00%)	48 (80.00%)
7.	Paddy straw/leaf mulching	60 (100.00%)	48 (80.00%)
Mean awareness score		6.43	4.13
t-test value		10.21**	

The above Table 2 represents the awareness level on in-situ moisture conservation technologies of farmers in the adopted and non-adopted villages. It shows that the 100% of farmers in the adopted village know the summer ploughing technology followed by 58.33% farmers of non-adopted villages. In case of zero tillage technology, 100% of farmers

in the adopted village and 86.67% of farmers in the non-adopted villages know about this technology. 91.67% of farmers in adopted village followed by 35% of farmers in non-adopted villages know about knowledge on repair of bunds technology. Whereas 51.67% of farmers in adopted village and 8.33% of farmers in non-adopted villages are aware of the land embankment technology. 100% of farmers in adopted village followed by 65% of farmers in non-adopted villages know about bunk making/levelling technology. 100% of farmers in adopted village know the plastic mulching technology whereas 80% of the farmers in non-adopted villages are aware about it. Coming to the knowledge on paddy straw/leaf mulching technology 100% of farmers in adopted village and 80% of farmers in non-adopted villages know the technology.

The mean awareness score on these technologies are 6.43 and 4.13 for adopted and non-adopted villages with a t-test value of 10.21 (significant at 1% level), which indicates that KVK-adopted villages are significantly more aware of climate resilient technologies than non-KVK villages.

**Table 3:** Awareness level on water harvesting and recycling technology

Sl. No.	Name of technology	Frequency of aware farmers	
		Adopted villages	Non-adopted villages
1.	Renovation or de-siltation of pond/water body	51 (85.00%)	43 (71.67%)
2.	Renovation irrigation channel	9 (15.00%)	51 (85.00%)
3.	5% model	0	0
4.	Construction of new pond	58 (96.67%)	60 (100.00%)
5.	Ground water recharge structure	17 (28.33%)	12 (20.00%)
6.	Digging of small pits in diara land	28 (46.67%)	7 (11.67%)
7.	Renovation of Pine	31 (51.67%)	3 (5.00%)
8.	Check dam	50 (83.33%)	15 (25.00%)
9.	Bamboo boring	16 (26.67%)	1 (1.67%)
Mean awareness score		4.33	3.20
t-test value		3.42**	

Table-3 represents the awareness level on water harvesting and recycling technologies of farmers in adopted and non-adopted village. In case of knowledge on renovation or de-siltation of pond/water bodies 85% of farmers in adopted village and 71.67% of farmers in non-adopted village were aware about this technology. 85% of farmers in non-adopted village followed by 15% of farmers in adopted village know the renovation irrigation channel technology. Farmers in adopted villages and non-adopted villages were not aware about the 5% model technology. Coming to the knowledge about technology on construction of new ponds 100% of farmers in non-adopted villages and 96.67% of farmers in adopted village knows the technology. 28.33% farmers in adopted villages and 20% of farmers in non-adopted villages know about the technology on ground water recharge structure. 46.67% of farmers in adopted villages and 11.67%

of farmers in non-adopted villages were aware about the technology on digging of small pits in diara land. 51.67% of farmers in adopted villages know the renovation of pine technology where only 5% of farmers in non-adopted villages know about the technology. In case of the technology on check dam 83.33% of farmers in adopted villages followed by 25% of farmers in non-adopted village know about the technology. In case of bamboo boring technology 26.67% of farmers in adopted village followed by 1.67% of farmers in non-adopted villages were aware of this technology.

The mean awareness score of these technologies are 4.33 and 3.20 for adopted and non-adopted villages with a t-test value of 3.42 (significant at 1% level), which indicates that KVK-adopted villages are significantly more aware of climate resilient technologies than KVK non-adopted villages.

**Table 4:** Awareness on other technologies

Sl. No.	Name of technology	Frequency of aware farmers	
		Adopted villages	Non-Adopted villages
1.	Adoption of submergence rice variety, if applicable	16 (26.67%)	3 (5.00%)
2.	Azolla production	28 (46.67%)	50 (83.33%)
3.	Fodder cultivation	35 (58.33%)	50 (83.33%)
4.	Animal husbandry for livelihood diversification	12 (20.00%)	35 (58.33%)
5.	Introduction of new crops for crop diversity	2 (3.33%)	10 (16.67%)
6.	Adoption of short duration rice for advancement of rabi season	18 (30.00)	23 (38.33%)
7.	Green manuring crops for soil fertility management	26 (43.33%)	45 (75.00%)
8.	Application of organic manure for texture management	5 (8.33%)	31 (51.67%)
9.	Application of soil amendment for soil pH management	9 (15.00%)	1 (1.67%)

10.	Introduction of fishery in renovated ponds/water bodies	48 (80.00%)	45 (75.00%)
11.	Installation of PVC permanent irrigation channel outlet	11 (18.33%)	8 (13.33%)
12.	Paddy transplanting through mechanical transplanter	23 (38.33%)	44 (73.33%)
13.	Alternate wet and dry method of rice cultivation	15 (25.00%)	34 (56.67%)
14.	Disease resistant varieties of potato and other crops	9 (15.00%)	1 (1.67%)
15.	Khaki Campbell duck	55 (91.67%)	6 (10.00%)
16.	Black Bengal goat	42 (70.00%)	10 (16.67%)
17.	Vegetable poly mulching in winter cucumber	47 (78.33%)	25 (41.67%)
18.	Zero tillage in wheat, maize etc	14 (23.33%)	17 (28.33%)
19.	Surface mulching of lentil, mustard	55 (91.67%)	18 (30.00%)
20.	Promotion of blackgram in upland jute fallows	40 (66.67%)	11 (18.33%)
21.	Cultivation of vegetables in trellis during kharif	41 (68.33%)	17 (28.33%)
22.	Income generation activities(mushroom, pickle making etc)	58 (96.67%)	54 (90.00%)
23.	Cultivation of cat fish in cemented tank	38 (63.33%)	2 (3.33%)
24.	Establishment of seed bank	39 (65.00%)	3 (5.00%)
25.	Multitier horticulture	46 (76.67%)	25 (41.67%)
26.	Contingent cropping	19 (31.67%)	4 (6.67%)
27.	Intercropping of vegetables with maize	28 (46.67%)	44 (73.33%)
28.	Low cost goatery	28 (46.67%)	21(35.00%)
29.	Effective utilization of upland	33 (55.00%)	6 (10.00%)
30.	Remunerative crop in orchard	49 (81.67%)	11 (18.33%)
31.	integrated farming system(pond based)	42 (70.00%)	15 (25.00%)
32.	Ratooning in sugarcane and intercropping	31 (51.67%)	56 (93.33%)
33.	Community nursery	54 (90.00%)	8 (13.33%)
34.	Azolla cultivation for livestock and poultry	38 (63.33%)	33 (55.00%)
35.	Vaccination camp and disease management of livestock and goat	10 (16.67%)	58 (96.67%)
36.	Crocodile bund	45 (75.00%)	3 (5.00%)
37.	Jute retting tank	20 (33.33%)	20 (33.33%)
Mean awareness score		18.18	14.12
t-test value		5.66**	

The Data in the above Table 4 represents the awareness on other climate resilient technologies of farmers in adopted villages and other villages. It shows that 26.67% of farmers in adopted villages and 5% of farmers in other villages know the technology of adopting submergence rice varieties. 83.33% of farmers in other villages and 46.67% of farmers in adopted villages know the Azolla production technology. In case of fodder cultivation technology 83.33% of farmers in other villages and 58.33% of farmers in adopted villages know this technology. In case of animal husbandry for livelihood diversification technology 83.33% of farmers in other villages and 20.00% of farmers in adopted villages know the technology. 16.67% of farmers in other villages and 3.33% of farmers in adopted villages know the technology on introduction of new crops for crop diversity. 38.33% of Non-Adopted farmers and 30.00% of farmers in adopted villages know the technology on adoption of short duration rice for advancement of rabi season.

In case of green manuring crops for soil fertility management technology 75.00% of farmers in other villages and 43.33% of farmers in adopted villages know the technology. In case of the technology on application of organic manure for texture management technology 51.67% of farmers in other villages and 8.33% of farmers in adopted villages know the technology. 15.00% of farmers in adopted villages and 1.67% of farmers in other villages know the technology on application of soil amendment for soil pH management. 80.00% of farmers in adopted villages and 75.00% of farmers in others villages know the technology on introduction of fishery in renovated ponds/water bodies. While in case of the knowledge on the installation of PVC permanent irrigation channel outlet technology 18.33% of farmers in adopted villages and 13.33% of farmers in other villages know about this technology. 73.33% of farmers in other villages and 38.33% of farmers in adopted villages know the technology

on paddy transplanting through mechanical transplanter. 56.67% of farmers in other villages and 25.00% of farmers in adopted villages know the technology on alternate wet and dry method of rice cultivation.

Coming to the knowledge on diseases resistant varieties of potato and other crops 15.00% of farmers in adopted villages and 1.67% of farmers in other villages know about this technology. In case of knowledge on the khaki Campbell duck 91.67% of farmers in adopted villages and 10.00% of farmers in other villages know about this technology. 70.00% of farmers in adopted village's and 16.67% of farmers in other villages have knowledge on the black Bengal goat technology. 78.33% of farmers in adopted villages and 41.67% of farmers in other villages know about the vegetable poly-mulching in winter cucumber. 28.33% of farmers of other villages and 23.33% of farmers in adopted villages have knowledge on zero tillage in wheat, maize etc. coming to the knowledge on surface mulching of lentil, mustard 91.67% of farmers in adopted villages and 30.00% of farmers in other villages know about this technology. 66.67% of farmers in adopted villages and 18.33% of farmers in other villages have knowledge on promotion of blackgram in upland jute fallows. 68.33% of farmers in adopted villages and 28.33% of farmers in other villages know the technology on cultivation on vegetables in trellis during kharif.

In case of income generation activities (mushroom, pickle making etc) 96.67% of farmers in adopted villages and 90.00% of farmers in other villages know this technology. 63.33% of farmers in adopted villages and 3.33% of farmers in other villages have the know ledge on cultivation of cat fishes in cemented tank. 65.00% of farmers in adopted villages and 5.00% of farmers in other villages know about the establishment of seed bank technology.

In case of the technology multitier horticulture 76.67% of farmers in adopted villages and 41.67% of farmers in other



villages know about this technology. 31.67% of farmers in adopted villages and 6.67% of farmers in other villages were aware about the contingency cropping technology. 73.33% of farmers in other villages and 46.67% of farmers in adopted villages are aware of the technology intercropping of vegetables with maize. 46.67% of farmers in adopted villages and 35.00% of farmers in others village knows about the low cost goatery technology. In case of the technology on effective utilization of upland 55.00% of farmers in adopted villages and 10.00% of farmers in other villages know the technology. 81.67% of farmers in adopted villages and 18.33% of farmers in other villages have knowledge on remunerative crop in orchard. 70.00% of the farmers in adopted villages and 25% of farmers in other villages have knowledge on integrated farming system (pond based).

Coming to the knowledge on ratooning in sugarcane and intercropping 93.33% of farmers in other villages and 51.67% of farmers in adopted villages know the technology. 90.00% of farmers in adopted villages and 13.33% of farmers in other villages have awareness on the community nursery. 63.33% of farmers in adopted village and 55.00% of farmers in other villages have awareness on Azolla cultivation for livestock and poultry. 96.67% of farmers in other villages followed by 16.67% of farmers in adopted villages have knowledge on vaccination camp and disease management of livestock and goat. 75.00% of farmers in adopted villages and 5.00% of farmers in other villages know the crocodile bund technology. 33.33% of both the farmers in adopted villages and other villages are aware about the technology on jute retting tanks.

The mean awareness score on these technologies are 18.18 and 14.12 for adopted and non-adopted villages with a t-test value of 5.62 (significant at 1% level), which indicates that KVK-adopted villages are significantly more aware of climate resilient technologies than non-Adopted villages.

### Conclusion

Farmers of adopted villages have more Awareness regarding climate resilient technologies when compared with non adopted village. Since Farmers in Non Adopted villages were aware about some climate resilient technologies but are not adopting technologies due to lack of complete knowledge on the technologies

### Reference

1. Anseera TP, Alex JP. Awareness and Adoption of Climate Resilient Technologies by Farmers of Palakkad and Wayanad District of Kerala State. *Indian Research Journal of Extension Education*. 2019;19(1):7-12.
2. Singh KM, Singh RKP, Abhay K. A Socio-Economic Study on Adoption of Modern Agricultural Technologies in Bihar, India; c2013. Online at <http://mpr.aub.uni-muenchen.de/52032/> MPRA Paper No. 52032, posted 7. December 2013 14:54 UTC
3. Singh RKP, Singh KM, Abhay K. A Study on Adoption of Modern Agricultural Technologies at Farm Level in Bihar. *Environment & Ecology*. 2014;32(4):1342-1346.
4. Savita S, Lalita V. Impact of Krishi Vigyan Kendra on adoption of improved agricultural production practices. *International Journal of Science, Environment and Technology*. 2017;6(2):993-1000.
5. Meena KC, Gupta IN. Impact of KVK Training Programmes on Adoption of Garlic Production Technology. *Journal of Krishi Vigyan*. 2018;1(2):41-43.
6. Gorfad PS, Thaker JN, Baraiya KP. Impact of Krishi

Vigyan Kendra in operational villages. *Gujarat Journal of Extension Education*; c2018. p. 44-48.

7. Dobariya JB, Thesiya NM, Desai VK. Impact of KVK activities in adopted villages of KVK-dang. *Gujarat Journal of Extension Education*. 2017;28(1):28-32.